EDUCATION RESOURCES FOR OCEANOGRAPHY AND EARTH SCIENCES

Last Modified:

1.0	Classroom !	M	I ater	ial	

- 1.1 Grades K-12
- 1.2 Higher Education
- 2.0 Collaborative, On-Line Education
- 3.0 Continuing Education for Teachers
- 4.0 Data/Images From Satellites
 - 4.1 For Classroom Use
 - 4.2 General
- 5.0 Field Trips/ Out of Class Experiences
- 6.0 Internet Sites for Students
- 7.0 Multimedia/CD-ROMs
- 8.0 Periodicals
- 9.0 Posters
- 10.0 Reaching the Internet
- 11.0 Resource Lists Like This One (On-Line)
- 12.0 Special Themes
 - El Niño 1997-98
 - 1998 International Year of the Ocean

LINKS TO RESOURCE DESCRIPTIONS

1.0 CLASSROOM MATERIAL

1.1 Grades K-12

American Chemical Society (K-12)

American Geological Institute (K-12)

American Geophysical Union (K-12)

Athena: Earth and Space Science for K-12 (9-12)

Cabrillo National Monument (5)

Center for Educational Technologies (CET) (K-12)

Classroom Connect (K-12)

Coral Reef Education for Students and Teachers (CREST) Manual (K-12)

Discovery Channel School (K-12)

Earth From Above

Earth Systems Education (K-12)

Earth System Science Community (9-12)

Earthwatch Global Classroom (K-12)

Event-Based Science (6-8)

Exploring Satellite Oceanography (9-12)

Federal Resources for Educational Excellence (FREE)

For Kids Only (NASA)

Forecasting the Future (Birch Aquarium) (5-12)

Gaia Crossroads Project (Bigelow Laboratory for Ocean Sciences)

International Oceanographic Foundation

InterNetwork MEDIA

JASON Project

Kids Do Ecology (K-6)

KidSat Project

LEARN (UCAR/NCAR) (6-9)

LEO-15 Ocean Research Station Internet Activities (6-8)

<u>Living Ocean: Ocean Color From Space</u> (9-10)

Monsoon CD-ROM (9-12)

NASA CORE

NASA Discover Earth (USRA) (5-12)

NASA Educational Programs K-12 (K-12)

NASA Educator Resource Centers (K-12)

NASA Looking at Earth From Space

NASA SpaceLink (K-12)

NASA's Earth Observing System (EOS)

NASA's Education Program

NASA's EOSDIS Distributed Active Archive Centers

NASA's National Space Science Data Center (NSSDC)

National Climatic Data Center (NOAA NCDC)

National Geographic "Xpeditions" (K-12)

National Geophysical Data Center (NOAA NGDC)

National Snow and Ice Data Center (NASA NSIDC)

Network Montana - Hydrosphere Activities

Newton's Apple

NOAA

Now What Software

Ocean Planet (Smithsonian Institution) (6-12)

Ocean World (Texas A&M University)

One Sky, Many Voices (6-8)

ODP: From Mountains to Monsoons CD-ROM (JOI) (9-12)

Perspectives on an Ocean Planet CD-ROM (TOPEX/Poseidon) (6-12)

Planet Earth Science (6-12)

Practical Uses of Math and Science (PUMAS) (3-12)

Project Oceanography (6-8)

Reports to the Nation (UCAR/NCAR)

Science Lesson Plans Over the Internet (UCI) (K-12)

Sea Ice CD-ROM (ESSC) (9-12)

Sea World/ Busch Gardens (K-12)

<u>Seastar!</u> (6-8)

SkyMath (5-8)

Space Shuttle Radar CD-ROM (NASA) (6-12)

Starfish: Educational Resources for Sustainability

Teaching the Physics and Math of Oceanography with Scientific Data (TOPEX) (11-12)

TOPEX/Poseidon Educational Outreach (K-12)

U.S. Geological Survey (USGS)

Visit to an Ocean Planet CD-ROM (TOPEX/Poseidon) (6-12)

Weather Channel (5-12)

Whales: A Thematic Web Unit (K-8)

Whales of the World (International Wildlife Coalition) (K-8)

Winds of Change CD-ROM (NASA JPL)

1998 International Year of the Ocean Kids' and Teachers' Corner (4-12)

1.2 Higher Education

An Introduction to Atmospheric and Oceanographic Data (UCAR/NCAR)

AERDE Environmental Research

American Chemical Society

Canada Centre for Remote Sensing (CCRS)

Earth From Above

Earth System Science Community

Earth System Science Education Server

Earth System Science and Global Change Learning Modules

Joint Education Initiative (JEI)

Our Dynamic Planet CD-ROM (UCSB)

NASA's Earth Observing System (EOS)

NASA's EOSDIS Distributed Active Archive Centers

National Snow and Ice Data Center (NASA NSIDC)

Remote Sensing Core Curriculum

Sea Ice CD-ROM (ESSC)

Starfish: Educational Resources for Sustainability

Teaching the Physics and Math of Oceanography with Scientific Data (TOPEX)

The Earth System (TESY)

The Remote Sensing Tutorial

UCAR

UCAR Global Change Instruction Program

UNESCO's Bilko Project

U.S. Coast Guard Academy

2.0 COLLABORATIVE, ON-LINE EDUCATION

Center for Educational Technologies

Federal Resources for Educational Excellence (FREE)

GLOBE Program

JASON Project

Network Montana - Hydrosphere Activities

One Sky, Many Voices

Project Oceanography

3 of 49

S'COOL

Sea World/ Busch Gardens

3.0 CONTINUING EDUCATION FOR TEACHERS

AERDE Environmental Research

American Geological Institute

Center for Educational Technologies

Colorado Alliance for Science

DataStreme

Earth and Space Science Technological Education Project

Earth From Above

Earth System Science for Teachers in the 21st Century

Earthwatch Global Classroom

Earthworks: Earth System Science for Secondary Teachers

Educational Center for Earth Observation Systems

Gaia Crossroads Project (Bigelow Laboratory for Ocean Sciences)

Geophysical Information for Teachers - GIFT (AGU)

GLOBE Program

Heritage On-Line

International Oceanographic Foundation

JASON Project

LEARN (UCAR/NCAR)

Marine Science Institute (Northern California)

Marine Science Institute (University of Texas)

Maury Project (American Meteorological Society)

Monterey Bay Aquarium Teacher Institute

NASA Discover Earth (USRA)

NASA's Education Program

NASA Educational Programs K-12

National Marine Educators Association

NOAA Office of Global Programs

Operation Pathfinder

PESTO (Aspen Global Change Institute)

Planet Earth Science

Project EarthSense

Science Saturdays (UCAR LEARN)

4.0 DATA/IMAGES FROM SATELLITES

4.1 For Classroom Use

AERDE Environmental Research

Earth From Above

Gaia Crossroads Project (Bigelow Laboratory for Ocean Sciences)

InterNetwork MEDIA

NASA Looking at Earth From Space

NOAA Satellite Information

Space Shuttle Radar CD-ROM (NASA)

Space Technology Education Program

Unidata (UCAR)

U.S. Geological Survey (USGS)

4.2 General

An Introduction to Atmospheric and Oceanographic Data (UCAR/NCAR)

Canada Centre for Remote Sensing (CCRS)

Catalog of Government Scientific CD-ROMs (NASA JPL)

COAPS NSCAT Animation Locator Maps

El Niño 1997-98 (http://podaac.jpl.nasa.gov/hot/)

NASA's EOSDIS Distributed Active Archive Centers

National Climatic Data Center (NCDC)

National Geophysical Data Center (NGDC)

National Oceanographic Data Center (NODC)

National Oceanic and Atmospheric Administration (NOAA)

National Snow and Ice Data Center (NASA NSIDC)

National Space Science Data Center (NSSDC)

TOPEX/Poseidon

Weather Channel

WXP Weather Processor (Purdue University)

5.0 FIELD TRIPS/ OUT OF CLASS EXPERIENCES

Birch Aquarium, Scripps Institute of Oceanography

Earthwatch Global Classroom

Educational Center for Earth Observation Systems

GLOBE Program (International Environmental Science and Education Partnership)

Kids Do Ecology

Marine Science Institute (Northern California)

Marine Science Institute (University of Texas)

NASA Quest Project

Network Montana - Hydrosphere Activities

Planet Earth Science, Inc.

Reef Ball Development Group

Schools of the Pacific Rainfall Climate Experiment (SPaRCE)

Seastar!

S'COOL

Whales: A Thematic Web Unit

6.0 INTERNET SITES FOR STUDENTS

Ace on the Case: Secrets @ Sea

(http://www.secretsatsea.org)

Federal Resources for Educational Excellence (FREE) "Welcome Students" page

(http://www.ed.gov/free/kids.html)

For Kids Only (NASA)

(http://kids.mtpe.hq.nasa.gov)

Kids Do Ecology

(http://www.nceas.ucsb.edu/nceas-web/kids/main.html)

NASA Student Involvement Program

(http://www.nsip.net)

National Geographic "Xpeditions"

(http://www.nationalgeographic.com/xpeditions)

Physical Oceanography From Space

(http://podaac.jpl.nasa.gov/kids)

TOPEX/Poseidon Kids Page

(http://www.csr.utexas.edu/tsgc/topex/kids/)

WhaleNet

(http://whale.wheelock.edu/Students.html)

Whales of the World (International Wildlife Coalition)

(http://www.webcom.com/~iwcwww/teachers_kit/tksix.html)

1998 International Year of the Ocean

(http://www.yoto98.noaa.gov/kids.htm)

7.0 MULTIMEDIA/ CD-ROMS

AERDE Environmental Research (Remote Sensing CD-ROMs)

Catalog of Government Scientific CD-ROMs (NASA JPL)

Classroom Connect

Discovery Channel School

Everything Weather CD-ROM (Weather Channel)

Great Lakes Solutions Seeker (Earth Systems Education)

InterNetwork MEDIA

Joint Education Initiative (JEI)

Monsoon CD-ROM

NASA CORE

NASA SpaceLink

NASA's EOSDIS Distributed Active Archive Centers

NASA's National Snow and Ice Data Center (NSIDC)

NASA's National Space Science Data Center (NSSDC)

Now What Software

ODP: From Mountains to Monsoons CD-ROM (JOI)

Perspectives on an Ocean Planet CD-ROM (TOPEX/Poseidon)

Planet Earth Science, Inc.

Planet Ocean CD-ROM (International Oceanographic Foundation)

The Remote Sensing Tutorial

Sea Ice CD-ROM (ESSC)

Space Shuttle Radar CD-ROM (NASA)

UCSB - Our Dynamic Planet CD-ROM

UNESCO's Bilko Project

Visit to an Ocean Planet CD-ROM (TOPEX/Poseidon)

Winds of Change CD-ROM (NASA JPL)

8.0 PERIODICALS

Current: The Journal of Marine Education (NMEA)

Earth in Space (AGU)

Earth Observer (EOS)

Earth System Monitor (NOAA NODC)

NASA MTPE Education Reports

NMEA News

Science Now (UCAR)

Sea Frontiers (IOF)

WonderScience (American Chemical Society)

9.0 POSTERS

Career Posters (American Geophysical Union)

ChemWalk (American Chemical Society)

Living Ocean: Ocean Color From Space

NASA's Earth Observing System (EOS)

National Geophysical Data Center (NOAA NGDC)

Sea World/ Busch Gardens

Shaded Relief Portrait of Continental U.S. (Joint Education Initiative)

U.S. Geological Survey (USGS)

10.0 REACHING THE INTERNET

Classroom Connect

Computers for Learning

Gifts In Kind

Heritage On-Line

NASA Educational Program (surplus equipment)

NASA Internet Handbook for Educators

NASA Quest Project

<u>NetDay</u>

Tech Corps

11.0 RESOURCE LISTS LIKE THIS ONE (ON-LINE)

Blue Web'N (a library of Blue Ribbon learning sites on the Web)

(http://www.kn.pacbell.com/wired/bluewebn/)

CoVis Online Resources

(http://www.covis.nwu.edu/Geosciences/resources/ocean.html)

EE Link (Environmental Education on the Internet)

(http://www.nceet.snre.umich.edu/)

Environmental Education Network (K-12 Environmental Resources for Teachers)

(http://www.envirolink.org/enviroed/envirok12.html)

Explorer (Resources for Science/Math Education)

(http://server2.greatlakes.k12.mi.us/)

Federal Resources for Educational Excellence (FREE)

(http://www.ed.gov/free/)

International Year of the Ocean Kids' and Teachers' Corner

(http://www.yoto98.noaa.gov/kids.htm)

Marine Institute: Network of Educational Topics

(http://www.ifmt.nf.ca/minet.htm)

NASA Eureka! (Showcases NASA online resources)

(http://nic.nasa.gov/Eureka/Education/index.html)

NASA Langely: Science Links and Lesson Plans

(http://k12unix.larc.nasa.gov/training/edlinks.html)

NASA Spacelink: An Aeronautics and Space Resource for Educators

(http://spacelink.nasa.gov)

NCDC Educational Climate Resources

(http://www.ncdc.noaa.gov/ol/climate/climateresourceseducational.html)

NOAA's Resource Guide for Teachers of Marine Science

(http://swfsc.ucsd.edu/BIBLIOGRAPHY/GUIDE.htm)

Ocean World (Texas A&M University)

(http://www-ocean.tamu.edu/education/oceanworld)

Oceanography on the Net (Scripps Institution of Oceanography)

(http://scilib.ucsd.edu/sio/dataserv)

Penn State Earth Science Links for Teachers

(http://www.ems.psu.edu/RelatedSites/teacher.html)

San Diego City Schools - Triton Project

(http://edtechip.sandi.net:8080/triton_project)

SDSC K-12 Resources for Space and Earth Science

(http://www.sdsc.edu/Education/K-12_Resources/)

TOPEX/Poseidon Educational Resources

(http://topex-www.jpl.nasa.gov/education/education.html)

TOPEX/Poseidon Outreach Bulletin Board

(http://www-ccar.colorado.edu/wwwboard/outreach/)

University of Illinois - Instructional Materials in Oceanography

(http://covis.atmos.uiuc.edu/geosciences/instructional/ocean/education.html)

UCAR Weather and Climate Education and Outreach

(http://www.ucar.edu/edu/eduhome.html)

UTCSR Educational Resources

(http://www.csr.utexas.edu/links/edu/)

WhaleNet

(http://whale.wheelock.edu/Teachers.html)

WINDandSEA

(http://www.lib.noaa.gov/docs/windandsea.html)

Woods Hole Oceanographic Institution K-12 Resources

(http://www.whoi.edu/k-12/k12-resources.html)

12.0 SPECIAL THEMES

El Niño 1997-98 (http://podaac.jpl.nasa.gov/el_nino/)

1998 International Year of the Ocean

RESOURCE DESCRIPTIONS

(in alphabetical order)

1998 International Year of the Ocean (rev. 03/26/98)

The Ocean is vital to life on earth. In recognition of the importance of the marine environment, the United Nations has declared 1998 the International Year of the Ocean (YOTO). This designation provides individual organizations and governments with an important opportunity to raise public awareness and understanding of the ocean and related issues.

The United States is participating in YOTO activities through the Ocean Principals Group, an informal group of federal agencies with ocean interests.

Learn more about Year of the Ocean activities and opportunities through their web site:

WWW: http://www.yoto98.noaa.gov

Their web site includes a Kids' and Teachers' Corner at:

WWW: http://www.yoto98.noaa.gov/kids.htm

AERDE Environmental Research (rev. 12/30/97)

Two CD-ROM educational products are available from AERDE Environmental Research: *SAR 101: Radar Eyes in the Sky*, which is an introduction to synthetic aperture radar (SAR), and *Radar Remote Sensing Imagery of Coastal Regions*. The products consist of CD-ROMs of documented SAR imagery and Users Guides. The material is designed for engineers, researchers, environmental managers, and post-secondary teachers. The cost is \$85 per CD-ROM. *SAR 101* is available in English, French, Spanish and Portuguese.

Dirk Werle AERDE Environmental Research P.O. Box 1002, Central Halifax, NS B3J 2X1 CANADA

Telephone: (902) 423-2211 FAX: (902) 423-1508 E-mail: dwerle@fox.nstn.ca

WWW: http://www.radarsatinaction.com

American Chemical Society/American Institute of Physics (rev. 11/26/97)

The American Chemical Society/American Institute of Physics publishes a magazine, *WonderScience*, for elementary school children to use under the direct supervision of adults. It describes fun physical science activities. They also publish ChemWalk Posters, featuring examples of chemistry encountered in the city, suburbs, and the country. They have resources geared for K-8, high school and college levels.

American Chemical Society
WonderScience Magazine or ChemWalk Posters

1155 16th Street, NW Washington, DC 20036

Telephone: (202) 452-2113 (ACS Education Div.); (800) 209-0423 to order products

E-mail: education@acs.org

WWW: http://www.acs.org/edugen2/education/aboutedu.htm

American Geological Institute (rev. 07/24/98)

Since its founding in 1948, AGI has worked to fulfill a three fold mission: to provide information services to the geoscience community, to coordinate improvements in earth science education, and to increase public awareness of the vital role geology plays in our world. In keeping with those goals, AGI provides GeoRef, an on-line database of geological references, and a variety of publications and services. Two publications of special interest are the *Earth-Science Education Resource Directory*, which describes educational resources from more than 330 Earth science organizations (\$14.95 for Educators), and *Earth Science Content Guidelines Grades K-12*, which provides curriculum information (\$15.00). Also, an *ELEMENTARY-SCHOOL EARTH-SCIENCE SOURCEBOOK* is in development. They also have the Portrait USA Digital Map (Poster) available, as well as other resources (see <u>JEI</u> entry for more info). Publications can be ordered via the Web, or from the address below.

AGI sponsors a Summer Workshop for Undergraduate Faculty: <u>Improving Delivery in the Geosciences</u>. The 1998 workshop was held in Columbia, South Carolina, July 18-24. The 1999 workshop will be held in Southern California.

AGI Publications Center P.O. Box 205 Annapolis Junction, MD 20701 Telephone: (301) 953-1744 FAX: (301) 206-9789

WWW: http://www.agiweb.org/agi/pubs/pubeduc.html

For questions, contact Terry Ames at:

American Geological Institute 4220 King Street Alexandria, VA 22302-1502 Telephone: (703) 379-2480 FAX: (703) 379-7563

E-mail: geopubs@agiweb.org WWW: http://www.agiweb.org

American Geophysical Union (AGU) (rev. 11/26/97)

The American Geophysical Union is an international scientific society with more than 33,000 members in over 115 countries. For over 75 years, AGU researchers, teachers, and science administrators have dedicated themselves to advancing the understanding of Earth and its environment in space and making the results available to the public. The AGU has several resources available for K-12 educators, such as slide sets, career posters, a geophysical careers brochure, and an earthquake curriculum, *Seismic Sleuths--A Teachers*

Package on Earthquakes for Grades 7-12. They also produce Earth in Space, a journal of geophysics intended for students and teachers (cost: approx. \$12/yr.). AGU also sponsors the Geophysical Information for Teachers (GIFT) workshops, which are two day teacher enhancement workshops held at American Geophysical Union (AGU) Fall and Spring Meetings. For more information, or to request fact sheets on their K-12 Education Projects, contact:

M. Frank Ireton, Ph.D. Manager, Education Programs American Geophysical Union 2000 Florida Ave., N.W. Washington, D.C. 20009

Telephone: (202) 462-6910, or -6900 ext. 243

FAX: (202) 328-0566

E-mail: fireton@kosmos.agu.org WWW: http://www.agu.org

American Meteorological Society

DataStreme (rev. 1/19/98)

The DataStreme Project provides K-12 teachers with a semester-long study of the atmosphere using real-time weather data. The course is carried out in part on a distance-learning basis and in part with local meteorologists and college faculty. Almost 1000 teachers have completed the course in conjunction with 85 participating sites. Teachers typically receive 3 hours of graduate credit for their participation.

DataStreme Central American Meteorological Society 1200 New York Ave. NW, Suite 410 Washington, D.C.

Telephone: (202) 682-9337 FAX: (202) 682-9341

E-mail: amsedu@dc.ametsoc.org

WWW: http://www.ametsoc.org/dstreme

Maury Project (rev. 07/24/98)

The Maury Project is the American Meteorological Society's comprehensive national program of teacher enhancement based on studies of the physical foundations of oceanography. The Project is conducted in partnership with the United States Naval Academy and the National Oceanic and Atmospheric Administration. A major component of the Maury Project is the offering of training and information sessions to teachers around the country on physical oceanographic topics and issues. The sessions are conducted by Maury Project Peer Trainers who have attended extensive summer training programs at the United States Naval Academy. The 1998 session was held July 20-31.

WWW: http://www.ametsoc.org/amsedu/maury/

Please contact either:

Dr. Ira W. Geer

Co-Director, Maury Project American Meteorological Society 1200 New York Avenue, NW, Suite 410 Washington, DC 20005 Tel: 202-682-9337

Fax: 202-682-9341 E-mail: amsedu@dc.ametsoc.org

Dr. David R. Smith

Co-Director, Maury Project c/o Oceanography Dept. United States Naval Academy 572 Holloway Road Annapolis, MD 21402 Tel: 410-293-6550 Fax: 410-293-2137

E-mail: drsmith@nadn.navy.mil

Aspen Global Change Institute (rev. 08/07/98)

The Aspen Global Change Institute sponsors the annual Pre-and In-Service Earth Science Training Opportunity (PESTO). During August 1997, 24 teachers attended their training workshop on global environmental change. For information on the 1998 workshop contact:

John Katzenberger Aspen Global Change Institute 100 East Francis Aspen, CO 81611

E-mail: agcimail@agci.org

WWW: http://www.gcrio.org/ASPEN/info/info.html

Athena: Earth and Space Science for K-12 (rev. 07/24/98)

Athena is a joint effort between several school districts in Washington state and the Science Applications International Corporation (SAIC). Their web site includes instructional material in Oceanography and other areas of Earth Scienceand accompanying Teacher Manuals.

WWW: http://athena.wednet.edu

Bigelow Laboratory for Ocean Sciences, Gaia Crossroads Project (rev. 08/26/98)

Bigelow Laboratory has developed an interdisciplinary program for grades K-12 using satellite remote sensing and image analysis software. An activity guide for teachers, *The Gaia Crossroads Project-Using Satellite Imagery in the Classrooms and Community*, is soon to be published.

Cindy Erickson, Project Co-Director The Gaia Crossroads Project Bigelow Laboratory for Ocean Sciences P.O. Box 475, McKown Point West Boothbay Harbor, ME 04575-0475 Telephone: (207) 633-9600

Telephone: (207) 633-960 FAX: (207) 633-9661

E-mail: cerickson@bigelow.org

WWW: http://www.bigelow.org/~gaia

Birch Aquarium/Scripps Institution of Oceanography (UCSD) (rev. 08/26/98)

Birch Aquarium has developed a global change curriculum: Forecasting the Future; Exploring Evidence for Global Climate Change. The curriculum spans several scientific disciplines and includes slides, videotapes, software, scientific experiment ideas, outreach classes, and an on-line question and answer service.

Birch also provides field trip opportunities for students of all ages. Laboratory experiences are available to elementary age students; topics include tide pools, kelp forest, and coral reefs.

Telephone: (619) 534-4085 E-mail: ksteitz@ucsd.edu

WWW (Forecasting the Future): http://aqua.ucsd.edu/nextwave/forecasting.html

WWW (Other programs): http://aqua.ucsd.edu/SBAM2/education.html

Cabrillo National Monument (new 08/26/98)

This branch of the National Park Service has produced an on-line, four-week unit *Cabrillo Tidepool Study* for fifth graders. Students gather information about various aspects of the tidepool, draft sciencific reports, and present their findings at a "scientific conference".

Cabrillo National Monument 1800 Cabrillo Memorial Drive San Diego, CA 92106 Phone: (619) 557-5450

WWW: http://edweb.sdsu.edu/triton/tidepoolunit/tidepool.html

Canada Centre for Remote Sensing (CCRS) (rev. 08/11/98)

The Canada Centre for Remote Sensing is involved in curriculum development, CD-ROM production, education and training. The User Education and Training Initiative (UETI) contains activities relevant to teachers at the high school and college level. Their web site includes an FAQ. An introductory remote sensing curriculum will be available soon from their web site.

Bill Bruce
Canada Centre for Remote Sensing
588 Booth Street
Ottawa, Ontario K1A 0Y7

CANADA

Telephone: (613) 947-1272 (Gen'l Inq.), (613) 996-2648 (Bill Bruce) FAX: (613) 996-9843 (Bill Bruce)

E-mail: info@ccrs.nrcan.gc.ca, bill.bruce@ccrs.nrcan.gc.ca WWW: http://www.ccrs.nrcan.gc.ca/ccrs/eduref/ref/faqe.html

Center for Educational Technologies (CET)

The Center for Educational Technologies (CET) offers a series of modules titled: "Exploring the Environment" that include modules on El Nino, hurricanes, water quality, and weather. The modules are part of NASA's Classrooms of the Future Project and were developed at Wheeling Jesuit University.

CET sponsors on-line, collaborative courses for elementary and middle school teachers interested in teaching earth system science.

Dr. Robert Myers Senior Instructional Designer NASA Classroom of the Future Wheeling Jesuit University 316 Washington Avenue Wheeling, WV 26003

E-mail: bmyers@cotf.edu

WWW: http://www.cotf.edu/ETE/

Center for Ocean-Atmospheric Prediction Studies (COAPS) NSCAT Animation Locator Maps

(new 11/30/98)

This site has over 1300 animations of surface winds from the NASA Scatterometer (NSCAT).

WWW: http://www.coaps.fsu.edu/nscat/animations.shtml

Classroom Connect

Classroom Connect promotes the use of the Internet in the classroom. They sponsor Internet-related conferences and seminars; maintain a database of schools that have Web sites (as well as put school Web pages on their server free of charge for schools that don't have access to a server); maintain a teacher contact database; and offer various educational products and resources, such as the *Classroom Connect Newsletter*, The Educator's INTERNET CD Club, *Science Internet Curriculum Guide*, lesson plans, and other CD-ROMs, software, videos and more.

Classroom Connect 1866 Colonial Village Lane P.O. Box 10488

Lancaster, PA 17605-0488

Telephone: (717) 393-1000, (800) 638-1639, (800) 471-2248 (quantity discounts)

FAX: (717) 393-5752

E-mail: (see Web site for different addresses)

WWW: http://www.classroom.net

Colorado Alliance for Science (rev. 11/26/97)

The Colorado Alliance for Science is a consortium of business, industry, public agencies, schools, and others working together to stimulate public interest and support for science, mathematics and technology education in Colorado through various programs, councils

and events. Among other things, they offer programs for teachers, match experienced people with classrooms needing special information, and hold an annual conference on educational issues.

Bob Mahler, Director Colorado Alliance for Science Campus Box 456 University of Colorado at Boulder Boulder, CO 80309-0456 Telephone: (303) 492-6392

E-mail: Robert.Mahler@colorado.edu WWW: http://www-co-cas.colorado.edu

Computers for Learning (new 11/30/98)

FAX: (303) 492-1585

This program is designed to donate surplus Federal computer equipment to schools and educational nonprofits, giving special consideration to those with the greatest need. The Computers for Learning website allows schools and educational nonprofits to register quickly and easily to request surplus Federal computer equipment.

Telephone: 1(888)362-7870 (toll free), available from 1-5 p.m. EDT, M-F

WWW: http://www.computers.fed.gov/

Coral Reef Education for Students and Teachers (CREST) Manual (new 11/24/98)

The CREST Manual is a manual on the basic ecology of coral reef ecosystems intended for use as an educational manual for elementary and high school instructors. It can also be used as a reference manual for researchers. It is specifically aimed to aid teachers and students in understanding the coral reef ecosystem and the necessity of protecting our coral reefs.

WWW: http://www.petsforum.com/IMA/, http://www.petsforum.com/IMA/CRAA.html

Discovery Channel School (rev. 12/04/97)

This Web site is associated with the Discovery Channel and the Learning Channel. They provide Educator Guides to accompany their TV channels, videos, programming schedules, and curricular materials.

Discovery Channel School P.O. Box 970

Oxon Hill, MD 20750-0970

Telephone: 1(888)892-3484 (toll free)

FAX: (301)567-9553

E-mail: info@school.discovery.com WWW: http://school.discovery.com

Earth and Space Science Technological Education Project (ESSTEP) (new 11/24/98)

The Earth and Space Science Technological Education Project (ESSTEP) announces it's

third season of teacher professional development workshops. This NSF-funded project is a joint effort of the Geological Society of America, Cypress College, and the Space Science Institute, and provides secondary and college faculty with training and support for optimal classroom use of computer and information-based technologies in earth, space, and environmental sciences.

Faculty apply as 2-4 person, multi-grade level, geographic-area teams and must commit to participate in two consecutive summer workshops. Hands-on training in Global Positioning Systems, Geographic Information Systems, Image Processing and Multimedia are interwoven with field experiences and discussions about standards, assessment of student learning, and effective teaching practices. The workshop teaching approach is inquiry-based and designed to model a variety of teaching strategies. Participants receive a \$600 stipend year one, \$300 in year two, in addition to room and board. Continuing education credits are available.

Summer workshops are scheduled for July 6-17, 1999 in Boulder, Colorado, and July 26-August 7, 1999 in Williamsburg, Virginia. Applications are due March 1,1999.

For more information and an application, contact:

Holly Devaul
The Geological Society of America
3300 Penrose Place, Boulder, CO 80301
Telephone: (303)447-2020 ext.150
E-mail: hdevaul@geosociety.org

WWW: not available yet

Earth From Above (new 03/24/98)

A web page is available for GSFC scientist Claire Parkinson's book, *Earth From Above*. This book provides an introduction to understanding and interpreting satellite images, using illustrative examples. The WWW site provides links to the publisher where you can order the book online, browse the table of contents, and read the book's preface. SPECIAL: The publisher is offering complimentary slide sets from the book for orders exceeding 25 copies as long as supplies last. Each set contains 62 color slides. (Quoted from *The Earth Observer*, Nov/Dec 1997, Education Highlights)

WWW: http://mirage.usra.edu/esse/earthabove.html

Earth Systems Education (ESE) (rev. 12/04/97)

Earth Systems Education (ESE) produces materials that emphasize the impact of global change on the Great Lakes. They produce a CD-ROM entitled *Great Lakes Solution Seeker*. They also produce several activity guides and books for elementary and secondary classrooms. ESE is a joint effort of the Ohio State University and the University of Northern Colorado.

Earth Systems Education Program Office School of Natural Resources The Ohio State University 2021 Coffey Road

Columbus, Ohio 43210

Telephone: (614)292-9826 (Dr. Rosanne Fortner)

E-mail: Fortner.2@osu.edu

WWW: http://www.ag.ohio-state.edu/~earthsys/

Earth System Science Community (ESSC) (rev. 12/04/97)

ESSC provides curricula for entire courses in Earth System Science, including assignments, quizzes, and sample student projects. This project is a joint effort of 12 high schools, 6 universities, the ECOLogic Corp., and NASA.

ECOLogic Corp. 19 Eye Street, NW Washington, D.C. 20001 Telephone: (202)218-4100 E-mail: essc@ecologic.net WWW: http://www.circles.org

Sea Ice CD-ROM (rev. 08/11/98)

Sea Ice in the Polar Regions & The Arctic Observatory is a pair of interactive multimedia applications on CD-ROM that enable students to understand and investigate polar processes. The CD is designed for high school and undergraduate students and is downloadable through this web site (for both Mac and Windows). It is organized into the two modules, with an accompanying Teacher's Guide for *The Arctic Observatory* module.

Contact Claire Parkinson with comments or questions regarding the *Sea Ice in the Polar Regions* module, or Farzad Mahootian regarding *The Arctic Observatory* module. This CD-ROM will soon be available through the NASA Teacher Resource Centers (at no charge).

E-mail: Claire.L. Parkinson. 1 @ gsfc.nasa.gov, farzad@jacks.gsfc.nasa.gov

WWW: http://www.circles.org/Round3/Resources/cd-rom1.html

Earth System Science for Teachers in the 21st Century (rev. 12/01/98)

The University of Pittsburgh at Bradford, in conjunction with NASA's Earth Science Enterprise, offers annual week-long workshops on interdisciplinary global science for pre-service education students and in-service teachers. The 1999 workshop will be held July 11-16.

Dr. Assad I. Panah Professor, Geology and Environmental Science Teacher Enhancement Workshop University of Pittsburgh at Bradford 300 Campus Drive Bradford, PA 16701-2898 Telephone: (814) 362-7569

FAX: (814) 362-5088 E-mail: aap+@pitt.edu

WWW: http://www.pitt.edu/~aap/

Earthwatch Global Classroom (rev. 12/04/97)

Earthwatch's Global Classroom offers on-line educational resources and virtual field trips, as well as a variety of scientific research expeditions for students and teachers.

Earthwatch International

P.O. Box 403

Watertown, MA 02272 Telephone: (800)776-0188 E-mail: info@earthwatch.org

WWW: http://www.Earthwatch.org/ed/home.html

Earthworks: Earth System Science for Secondary Teachers (rev. 11/24/98)

This one-week workshop provides an opportunity for teachers to investigate Earth system science. We'll combine geology, meteorology, biology, chemistry and more to study the environment around us. You'll work with scientists and other teachers to develop your understanding of the Earth as well as your teaching skills. This workshop is designed for pre-service and new in-service teachers, who are interested or involved in teaching secondary science. We also welcome experienced teachers who are looking for a new view of Earth science.

We focus on providing a self-directed learning experience in which you can develop an understanding of Earth systems and share that understanding with others. You'll become part of an ongoing community, including teachers and scientists, which provides discussion and support throughout the school year. Cost to participants will be minimal (most expenses will be covered). The program is sponsored by CIRES (Cooperative Institute for Research in Environmental Sciences), University of Colorado, Boulder, and by NASA's Earth Science Enterprise.

The workshop is scheduled for June 20-25, 1999, in Boulder, CO. The application deadline is April 30, 1999. Please apply early; space is limited.

For further information or to apply, please contact:

Ken Emo CIRES Campus Box 216 University of Colorado Boulder, CO 80309-0216 Telephone: (303) 492-5657

FAX: (303) 492-1149

E-mail: Kenneth.Emo@colorado.edu

WWW: http://cires.colorado.edu/~k12/earthworks

Educational Center for Earth Observation Systems (rev. 12/01/98)

The Educational Center for Earth Observation Systems is a member of the Pennsylvania

Space Grant Consortium and holds March conferences, GLOBE and other workshops, promotes curriculum development, has summer space programs for middle and high school students, and provides instruction and documents. The Satellites and Education Conference XII will be held March 10-12, 1999. Register by Feb. 10, 1999 for a discount.

Educational Center for Earth Observations Systems Nancy McIntyre, Director 189 Schmucker Hall West Chester University West Chester, PA 19383-9769 Telephone: (610) 436-2393

FAX: (610) 436-3045

E-mail: nmcintyre@wcupa.edu

WWW: http://144.26.13.136/eos.home.html

Event-Based Science (rev. 12/04/97)

Event-Based Science develops science modules at the middle school level using newsworthy events to establish the relevance of the material. Subjects include hurricanes, tornadoes, volcanos, oil spills, and floods. Links to related web sites on these topics are provided from the web site below. The full modules, including teachers' guides and videos, are available at modest cost. Call for their catalog and order form:

Russel Wright, EBS Project Director

Telephone: (800) EBS-7252

WWW: http://mcps.k12.md.us/departments/eventscience/index.html

Exploring Satellite Oceanography (rev. 12/08/97)

This is a high school lesson plan for using satellite imagery to teach oceanography. The emphasis is upon how sea surface temperature varies over space and time.

WWW: http://rs.gso.uri.edu/amy/avhrr.html

Federal Resources for Educational Excellence (FREE) (new 08/26/98)

FREE offers quick access to hundreds of teaching and learning resources across the federal government; a place where teachers, federal agencies, and other organizations can begin forming partnerships to develop new resources for teaching and learning, and information about an effort to support partnerships of federal agencies and teachers, as well as other organizations, to develop Internet-based learning resources and Internet-based learning communities.

WWW: http://www.ed.gov/free/

Gifts in Kind

This company provides software, hardware and other supplies to non-profit agencies/companies at reduced prices.

Gifts in Kind 333 N. Fairfax St. Alexandria, VA 22314 Telephone: (703) 836-2121 FAX: (703) 549-1481

E-mail: ProductDonations@GiftsInKind.org

WWW: http://www.GiftsInKind.org

GLOBE Program (rev. 12/04/97)

Global Learning and Observations to Benefit the Environment (GLOBE) is a worldwide network of K-12 students, teachers, and scientists working together to study and understand the global environment. By participating in GLOBE, teachers guide their students through daily, weekly, and seasonal environmental observations, such as air temperature and precipitation. Over 2000 schools from 58 countries are involved. Using the Internet, students send their data to the GLOBE Student Data Archive. Scientists and other students use this data for their research.

GLOBE provides free teacher training workshops to those teachers wanting to participate in the program (provided that their school meets the program criteria).

Telephone: (800) 858-9947 E-mail: help@globe.gov WWW: http://www.globe.gov

Heritage OnLine

Heritage OnLine, a new program of the Heritage Institute, is a provider of Internet-based 400/500-level continuing education courses for K-12 teachers. They focus on guiding K-12 educators in integrating use of the Internet into their K-12 classroom curriculum. In addition to offering on-line courses, they also send out information mailings via e-mail, and have a K-12 OnLine Resources list.

The Heritage Institute 2802 E. Madison Ave., Suite 187 Seattle, WA 98112

Telephone: (800) 445-1305 E-mail: mail@hol.edu WWW: http://www.hol.edu

International Oceanographic Foundation

The International Oceanographic Foundation is a non-profit organization. Its mission is to encourage scientific investigation of the sea, to provide the public with current, accurate, and unbiased information pertaining to marine environments, and to promote awareness of the importance of the Earth's oceans to humankind.

The IOF publishes a magazine, *Sea Frontiers*, a pamphlet, *Training and Careers in Marine Science* (\$5.00), and *Ocean Life*, a book on marine habitats, flora, and fauna (\$29.95). The organization is negotiating sponsorship of educational videos, a compact

disc for CD-ROM called *Planet Ocean*, and an authoritative pamphlet series. The IOF serves as an informational clearing house for members, teachers, students and the general public looking for marine science career referrals, visual aids, and answers to specific questions. The IOF also offers members sea-oriented travel opportunities through its travel-study program, Sea Safaris.

International Oceanographic Foundation Rosenstiel School of Marine and Atmospheric Science 4600 Rickenbacker Causeway Miami, FL 33149-1098 Telephone: (305) 361-4888

FAX: (305) 361-4711

E-mail: dtyrrell@rsmas.miami.edu

WWW: http://www.rsmas.miami.edu/iof

International Wildlife Coalition (new 08/07/98)

The International Wildlife Coalition produces the "Whales of the World" Educational Program, consisting of numerous on-line activities for students and an associcated Teacher's Guide.

WWW: http://www.webcom.com/~iwcwww/teachers_kit/tksix.html

InterNetwork MEDIA (rev. 12/05/97)

InterNetwork's core mission is to further Earth awareness and the issues related to global change. They have provided communications service and support to the major Earth-Science agencies such as NASA, the USGS, and NOAA, for over a decade. Several educational CD-ROM products are available for purchase (quantity discounts available):

NEW: *Embracing Earth: Global Change* explores the natural and human forces that shape and reshape Earth's land, oceans, and atmosphere and has in-depth coverage of El Niño, Ozone Depletion, and Climate Change (\$29.95).

GeoMedia (produced with the USGS), an interactive, multimedia CD that deals with earthquakes, water & carbon cycles, the greenhouse effect, environmental change, geologic time scales and maps (\$39.95, new reduced price).

Turning the Tide, about our coastal environment (\$24.95, new reduced price).

Earth Visions I, II, III, a collection of images of the earth from various perspectives, including satellite sensors, the Space Shuttle, and close-up photography (\$14.95 ea., \$34.95 all 3).

InterNetwork Media 411 Seventh St. Del Mar, CA 92014-3013 Telephone: (619) 755-0439 FAX: (619) 481-8181 E-mail: inm@in-media.com

WWW: http://www.in-media.com

JASON Project (rev. 12/08/97)

JASON sponsors on-line expeditions to remote locations. The current expedition is to the "Oceans of the Earth and Beyond". There are satellite broadcasts and on-line chats. Students study about all aspects of the ocean.

JASON Foundation for Education 395 Totten Pond Road Waltham, MA 02154 Phone: (781) 487-9995

FAX: (781) 487-9999 E-mail: info@jason.org

WWW: http://www.jasonproject.org

Joint Education Initiative (rev. 12/04/97)

The Joint Education Initiative (JEI, formerly known as JEdI) is an informal group of government agencies, companies, and educators formed in 1990 "to broaden educational horizons and promote the advancement of Science." They have an excellent unit, *Introduction to Remote Sensing*, available on CD-ROM. The disk is distributed with a Users Manual and Teacher Activities (cost: \$24.95; Mac & PC compatible). Also available is the original JEdI 3-Disk set with a wide range of data sets dealing with Astronomy, Oceanography, Geology, Geophysics, Remote Sensing, and Meteorology. Cost is \$34.50, including Users Manual and Teacher Activities. DOS-based. Order from:

Office of Technology Liaison 4312 Knox Road University of Maryland College Park, MD 20742-5121

Telephone: (301) 405-4209 or 4210

FAX: (301) 314-9871

E-mail: cg54@umail.umd.edu

WWW: http://jei.umd.edu/jei/jei.html

Other products also available:

Portrait USA CD-ROM: Cost \$89.95 (Educational price \$59.95). Includes manual. An interactive CD-ROM that provides a comprehensive look at the geophysics of the United States, including topography, geography, geology, etc.

Shaded-Relief Portrait of the Continental United States and Environs digital poster: This poster is a 60"x36" computer-generated image of the topography and bathymetry of the lower 48 United States, southern Canada, and northern Mexico. It provides a unique view of the landscapes and the total physiographic environment. Cost: \$14.95 for Educators. Order from:

AGI Publications Center P.O. Box 205

Annapolis Jct., MD 20701 Telephone: (301) 953-1744 FAX: (301) 953-2838

WWW: http://jei.umd.edu/jei/jei.html

Contact JEI for more information:

Christopher M. Keane Joint Education Initiative Department of Geology University of Maryland College Park, MD 20742-3281 Telephone: (301) 405-4090 FAX: (301) 314-9661

E-mail: keane@jei.umd.edu
WWW: http://jei.umd.edu/jei/jei.html

Gopher: gopher://jei.umd.edu/

Internet ListServe: TIE-L (Technology in Education)

Joint Oceanographic Institutions (JOI) (rev. 08/07/98)

The JOI/U.S.Science Support Program's interactive education program, "ODP: From Mountains to Monsoons," brings scientific results of the Ocean Drilling Program into the classroom. Students test the theory of a possible link between the uplift of the Himalayan Mountains and the intensification of the monsoons in Southern Asia. A Teacher's Guide is available on-line, or in hard-copy upon request. This product is available free of charge.

Joint Oceanographic Institutions, Incorporated 1755 Massachusetts Avenue, NW, Suite 800 Washington, DC 20036-2102 USA

Telephone: (202) 232-3900

Fax: (202) 232-8203 E-mail: joi@brook.edu

WWW: http://www.joi-odp.org/JOI/Education/Education.html

KidSat Project (rev. 12/19/97)

KidSat provides students with observations of planet Earth as seen by the Space Shuttle. Views are provided of massive Indonesian fires from space; the connections of the fires to the current El Nino are explained.

WWW: http://kidsat.jpl.nasa.gov

Kids Do Ecology (rev. 12/19/97)

Kids Do Ecology provides activities for students learning about marine ecology and marine life.

Kids Do Ecology

National Center for Ecological Analysis and Synthesis

735 State St., Suite 300

Santa Barbara, CA 93101-3351

WWW: http://www.nceas.ucsb.edu/nceas-web/kids/main.html

LEO-15 Ocean Research Station Internet Science Activities (new 01/09/98)

LEO-15 is an underwater long-term ecological laboratory. A series of instructional modules for middle school students has been developed in conjunction with this laboratory. Topics include: Upwelling Along the New Jersey Shore, Looking for the Gulf Stream, and Phytoplankton.

E-mail: mcdonnel@imcs.rutgers.edu

WWW: http://marine.rutgers.edu/pt/activities/cred.htm

Marine Science Institute (Northern California)

The Marine Science Institute offers several voyages for students aboard a teaching/research vessel in the waters around San Francisco, California.

Telephone: (650) 364-2760

WWW: http://www.sfbaymsi.org/programs.htm

Marine Science Institute (University of Texas) (new 08/07/98)

The Marine Science Institute at the University of Texas, Port Aransas offers weekend teacher workshops. Recent topics have included: Global Change, Basic Marine Science, and WHALENET (a computer workshop). The institute also offers opportunities for classes to board a ship and perform scientific experiements.

Marine Education Services Program Office Marine Science Institute 750 Channelview Drive Port Aransas, TX 78373-5015

Phone: (512) 749-6729 Fax: (512) 749-6703

E-mail: %20tinin@utmsi.utexas.edu

WWW: http://www.utmsi.zo.utexas.edu/mes/mesdesc.htm

Monterey Bay Aquarium Teacher Institute (new 07/24/98)

Monterey Bay Aquarium is looking for teams of elementary or middle school teachers for their Teacher Institute 1998-2000. Teachers are provided with hands-on education to study coastal watersheds, wetlands, rocky and sandy shores, kelp forests, the Monterey Canyon, and the global water system. The program consists of 11-day summer sessions and three follow-on weekends.

Rita Bell Educator Programs Monterey Bay Aquarium 886 Cannery Row

Monterey, CA 93940 Phone: (408) 648-4845 E-mail: rbell@mbayaq.org

National Aeronautics and Space Administration (NASA) (rev. 12/01/97)

NASA CORE (rev. 12/01/97)

NASA CORE (Central Operation of Resources for Educators) is the central point of contact for NASA's audiovisual educational materials. Their catalog lists products that they distribute at minimal cost, including videocassettes, slide programs, CD-ROMs and computer programs. Of particular relevance is the EOS Educators Visual Materials Package, containing slides and teaching units on selected Earth Science themes. Oceanography topics include: El Niñno; Gulf Stream Temperatures; Baja Ocean Color; Ocean Topography; Wind Speed and Wave Height, and Surface Wind Fields over the Ocean. There is a cost associated with this product.

NASA CORE Lorain County JVS 15181 Route 58 S Oberlin, OH 44074

Telephone: (440) 774-1051, Extension 249 or 293

FAX: (440) 774-2144

E-mail: nasaco@leeca.esu.k12.oh.us WWW: http://spacelink.nasa.gov/CORE

Education Program (new 12/01/97)

This NASA site includes information about On-Line Resources for Educators, Teacher/Faculty Preparation and Enhancement Programs (K-12 and above), Student Support Programs (K-12 and above), Curriculum Support and Dissemination Programs, Minority University Research and Education Programs, and how to acquire NASA surplus equipment (computers, etc.) for schools.

WWW: http://www.hq.nasa.gov/office/codef/education/index.html

Educational Programs K-12 (rev. 08/11/98)

NASA provides a wide range of lesson plans and related material for the K-12 classroom. They also sponsor continuing education programs for teachers.

WWW: http://pao.gsfc.nasa.gov/gsfc/educ/k-12/k-12.htm

Educator Resource Centers (rev. 08/11/98)

NASA's network of Educator Resource Centers provide a wealth of information for educators: publications, reference books, slide sets, audio cassettes, videotapes, telelecture programs, computer programs, lesson plans, and teacher guides with activities. Each Center is intended to service particular geographic regions. A list of the Centers can be obtained from:

WWW: http://www.teacherlink.usu.edu/nasa/accessnasa/TRC.html

For Kids Only (new 08/07/98)

This internet site is a source of lesson plans covering El Nino and Atmospheric Pressure. The site is intended to be used directly by students.

WWW: http://kids.mtpe.hq.nasa.gov

Living Ocean: Ocean Color From Space (rev. 12/08/97)

The Living Ocean Project provides materials for study of the ocean life based on satellite observations. The project is part of NASA's SeaWifs mission to observe ocean color from space. A poster is also available electronically.

WWW:

http://seawifs.gsfc.nasa.gov/SEAWIFS/LIVING OCEAN/LIVING OCEAN.html

Looking at Earth From Space (rev. 12/01/97)

The NASA series of publications entitled *Looking at Earth From Space* was developed to familiarize educators with global change issues and Mission to Planet Earth, and to enable teachers to enhance classroom studies with hands-on activities using satellite images. The publications include information how to obtain and set up environmental satellite ground stations, how to interpret the data, and lesson plans. The publications are available from the NASA Teacher Resource Center network. For more information, contact:

Dr. Gerald Soffen Director, University Programs Goddard Space Flight Center, Code 160 Greenbelt Road Greenbelt, MD 20771

E-mail: gsoffen@pop100.gsfc.nasa.gov

WWW: http://eospso.gsfc.nasa.gov/Earth_Glossary/Intro.html

Monsoon and Data Assimilation CD-ROM (rev. 03/24/98)

NASA has developed a CD-ROM entitled *The Monsoon and Data Assimilation* for high school students. For more information, contact:

GSFC DAAC User Services, Code 902 NASA Goddard Space Flight Center Greenbelt, MD 20771

Telephone: (301) 614-5224, or 1 (800) 257-6151

FAX: (301) 614-5268

E-mail: daacuso@daac.gsfc.nasa.gov WWW: http://daac.gsfc.nasa.gov/

Monthly Earth Science Education Reports (rev. 08/11/98)

These monthly reports provide an update of the efforts of NASA and others in earth system science education.

WWW: http://www.hq.nasa.gov/office/mtpe/edreports.html

Quest Project

The Quest Project provides opportunities to engage in online chats with scientists. One current theme is "Women in Science", a chance to learn how women are making a contribution in the fields of science, math, and technology. Another current theme is "Shuttle Team Online", which provides opportunities for students to interact with Space Shuttle team members.

Quest also has prepared a handbook and video on how to connect your classroom to the internet.

WWW: http://quest.arc.nasa.gov

Space Shuttle Radar CD-ROM (rev. 08/11/98)

JPL has developed a space shuttle radar CD-ROM education package that contains teaching modules on radar remote sensing. It contains a teachers resource guide, presentation materials, and lesson guides in addition to five modules. The modules are: Mission to Planet Earth, How Radar Images the Earth, SIR-C/X SAR, Looking at Radar Images, and Exploration and Discovery. It is suitable for middle and high-school Earth science, computing, or geography programs. Material includes radar imagery, hand-held shuttle photographs, maps, ground photographs, S/W for image display, and documents. To order a copy of the SIR-C Educational CD-ROM, Vol. 3 (for \$5, incl. shipping), contact:

EDC DAAC User Services U.S. Geological Survey EROS Data Center Sioux Falls, SD 57198 Telephone: 605-594-6116 FAX: 605-594-6963

E-mail: edc@eos.nasa.gov

WWW: http://edcwww.cr.usgs.gov/landdaac/sir-c/educational.html (has order form)

Also available for \$12 (incl. shipping, handling & support) from:

NASA CORE

E-mail: nasaco@leeca.esu.k12.oh.us WWW: http://spacelink.nasa.gov/CORE

For an on-line companion to the *SIRCED03* CD-ROM, or to view the contents of the CD-ROM, see: http://southport.jpl.nasa.gov/html/cdrom.html

Further educational material on the shuttle radar program can be found here:

http://southport.jpl.nasa.gov

NASA's Earth Observing System (EOS) (rev. 11/26/97)

The Earth Observing System makes available educational resources such as EOS Science Posters, NASA Fact Sheets, and EOS Educators' Visual Materials, as well as *The Earth Observer*, the EOS newsletter. They also have links to a Remote Sensing Tutorial, Studying Ocean Color from Space curriculum, and other relevant resources.

To order posters, use their on-line order form, or contact Hannelore Parrish (ittakes 8 weeks to receive a set of posters.) To subscribe to *The Earth Observer*, contact Lynda Williams. Both posters and newsletters are accessible on-line.

EOS Project Science Office NASA/ Goddard Space Flight Center Code 900 Greenbelt, MD 20771

Telephone: (301) 441-4032 (Hannelore Parrish); (301)286-0924 (Lynda Williams) E-mail: hannelore.parrish@gsfc.nasa.gov, lynda.p.williams.1@gsfc.nasa.gov WWW: http://eospso.gsfc.nasa.gov/ (see Education and Publications links)

NASA's EOSDIS Distributed Active Archive Centers (rev. 09/11/98)

There currently are eight Distributed Active Archive Centers (DAACs) responsible for Earth Science data archival, product development, distribution and user support. The DAACs are part of EOSDIS (Earth Observing System Data and Information System). The DAACs are distinguished from one another by data subject area and hold pre-EOS data that can be used to address global change issues. Their mandate is to support science users, but some of the data can be used by educators. Staff from these Centers are also available to give seminars on their products and on the systems for accessing data products. Seminars are available subject to resource constraints.

A listing of CD-ROM products distributed by the DAACs, including links to each of the DAAC web pages, can be found at:

http://eos.nasa.gov/daac/fliers/cd_fl.html

Also, Informational Products for Educational Use Available from the EOSDIS DAACs and Other Cooperating Data Centers:

http://eos.nasa.gov/daac/fliers/ed_fl.html

An order form for the EOSDIS Data Sampler CD-ROM, a CD-ROM of information, images, and animations that introduce the Earth science data sets held at NASA's EOSDIS DAACs and cooperating data centers:

http://eos.nasa.gov/daac/fliers/sampler.html

DAAC Listings

Alaska SAR Facility (ASF) DAAC - Synthetic Aperture Radar Products & Polar Regions

Voice: 907-474-6166 Fax: 907-474-5195

E-mail: asf@eos.nasa.gov

WWW: http://www.asf.alaska.edu

EROS Data Center (EDC) DAAC - Land Processes

Voice: 605-594-6116 Fax: 605-594-6963

E-mail: edc@eos.nasa.gov

WWW: http://edcwww.cr.usgs.gov/landdaac

Goddard Space Flight Center (GSFC) DAAC - Upper Atmosphere, Global Biosphere

Voice: 301-614-5224 Fax: 301-614-5268

E-mail: gsfc@eos.nasa.gov

WWW: http://daac.gsfc.nasa.gov

Jet Propulsion Laboratory (JPL) DAAC - Physical Oceanography (a.k.a. PO.DAAC)

Voice: 626-744-5508 Fax: 626-744-5506

E-mail: jpl@eos.nasa.gov

WWW: http://podaac.jpl.nasa.gov

(For more detailed information, see below.)

Langley Research Center (LaRC) DAAC - Radiation Budget, Tropospheric Chemistry

Voice: 757-864-8656 Fax: 757-864-8807

E-mail: larc@eos.nasa.gov

WWW URL: http://eosweb.larc.nasa.gov

National Snow and Ice Data Center (NSIDC) DAAC - Snow and Ice, Cryosphere and

Climate

Voice: 303-492-6199 Fax: 303-492-2468

E-mail: nsidc@eos.nasa.gov

WWW: http://www-nsidc.colorado.edu

Oak Ridge National Laboratory (ORNL) DAAC - Biogeochemical Dynamics

Voice: 423-241-3952 Fax: 423-574-4665

E-mail: ornl@eos.nasa.gov

WWW: http://www-eosdis.ornl.gov

Socioeconomic Data and Applications Center (SEDAC) - Human Impact on Global

Change

Voice: 914-365-8920 Fax: 914-365-8922

E-mail: sedac@eos.nasa.gov WWW: http://sedac.ciesin.org

Physical Oceanography DAAC (PO.DAAC) (rev. 12/01/97)

The Physical Oceanography Distributed Active Archive Center at JPL has the following data that are suitable for senior high school and university programs:

- (1) The TOPEX/Poseidon Informational CD-ROM: Perspectives on an Ocean Planet
- (2) The MCSST-CZCS CD-ROM data set, 1978-1986, monthly averaged co-registered

AVHRR MCSST and CZCS data (5 CD-ROMs)

- (3) TOGA (Tropical Ocean-Global Atmosphere Project) CD-ROM data set, 1985-1990 (7 CD-ROMs)
- (4) **NEW**: Global Ocean Surface Temperature Atlas Plus (GOSTAplus) CD-ROM (1851-1995)

PO.DAAC also distributes software that allows the user to display and plot hydrographic and tracer section data: ATLAST for IBM-compatible machines, and Power OceanAtlas for Macintosh. IMAGIC, an image processing software package for the Macintosh, is also available. (These programs also available via ftp.)

More complete descriptions of all of PO.DAAC's data sets can be found in our Data Catalog available on our Web page http://podaac.jpl.nasa.gov/Data_Catalog.shtml, or in hard copy upon request. For further information, contact the User Services Office:

PO.DAAC User Services Office MS 300/320 Jet Propulsion Laboratory 4800 Oak Grove Drive Pasadena, CA 91109 U.S.A. Telephone: (818) 354-9890

FAX: (818) 393-2718

E-mail: podaac@podaac.jpl.nasa.gov WWW: http://podaac.jpl.nasa.gov FTP: podaac.jpl.nasa.gov/pub

NASA's Jet Propulsion Laboratory (JPL) (rev. 12/01/97)

Catalog of Government Scientific CD-ROMs (rev. 12/02/97)

The Data Distribution Laboratory's (DDL) Catalog of Government Scientific CD-ROMs is an on-line collection of CD-ROMs of planetary science, space science, earth science, and other miscellaneous data sets. Browse through over 400 CD-ROMs in the DDL's 500-CD jukebox. The catalog contains descriptions and contact information for most of the CD-ROMs in the jukebox.

WWW: http://stargate.jpl.nasa.gov:1080

NSCAT Winds of Change Educational CD-ROM (rev. 09/11/98)

The NSCAT/QuikScat/SeaWinds Educational Outreach page contains information on the *Winds of Change* educational CD-ROM, as well as information on new educational resources they're developing. The CD can be ordered directly thru the JPL Educator Resource Center (see <u>below</u>), free of charge.

WWW: http://winds.jpl.nasa.gov/education/eduindex.html

Public Information Office

JPL has a public information office that is a source of topical information.

Public Information Office Jet Propulsion Laboratory Mail Stop 186-120 4800 Oak Grove Drive Pasadena, CA 91109

Telephone: (818) 354-5011 E-mail: newsdesk@jpl.nasa.gov WWW: http://www.jpl.nasa.gov

FTP: ftp.jpl.nasa.gov/pub (or 137.78.181.5)

Modem: (818) 354-1333.

Educator Resource Center (rev. 09/11/98)

To obtain the Teacher Package which contains a current list of math and science-oriented materials on JPL projects, write to the address below on school stationery. TOPEX/POSEIDON videotapes and lithographs are available from the Center, as well as the NSCAT educational CD-ROM, *Winds of Change*.

NASA Educator Resource Center Jet Propulsion Laboratory Mail Stop 601-107 4800 Oak Grove Drive Pasadena, CA 91109

Telephone: (818) 354-6916 FAX: (818) 354-8080

WWW: http://learn.jpl.nasa.gov/trc.htm

The Speakers Bureau at JPL is at: (818) 354-9312.

TOPEX/Poseidon Information (rev. 09/11/98)

TOPEX/Poseidon is an on-going mission (NASA and CNES) to observe global ocean circulation. Project information, images and science results can be obtained from the following source:

TOPEX/Poseidon Project Office Jet Propulsion Laboratory, MS 264-686 4800 Oak Grove Drive Pasadena CA 91109-8099 Telephone: (818) 354-0151

Telephone: (818) 354-0151 FAX: (818) 354-0368 E-mail: topex@jpl.nasa.gov

WWW: http://topex-www.jpl.nasa.gov,

and: http://podaac.jpl.nasa.gov/topex (info and images)

The TOPEX/Poseidon Informational CD-ROM, *Perspectives on an Ocean Planet*, can be previewed and ordered (free of charge) via this web page: http://podaac.jpl.nasa.gov/edu/tecd.html

31 of 49

A new TOPEX/Poseidon Educational CD-ROM, *Visit to an Ocean Planet*, will be available in Fall 1998. It consists of teaching materials for middle-to-high school classrooms, including a tutorial about the 1997-98 El Niño conditions, an interactive game that teaches about Earth-orbiting satellites, and profiles of 16 oceanographers and their work. An on-line order form is available at: http://topex-www.jpl.nasa.gov/education/cdrom.html.

The University of Texas Center for Space Research has an educational TOPEX/Poseidon web page:

http://www.csr.utexas.edu/tsgc/topex/

NASA's National Snow and Ice Data Center (NSIDC) (rev 11/20/98)

The National Snow and Ice Data Center (NSIDC) is a data and information resource for those studying snow and ice, and their importance to the Earth system. They have an Education Resources web page that includes information about glaciers, ice shelves and icebergs, blizzards, Q & A's about snow, as well as *Points, Pixels, Grids and Cells: A Mapping and Gridding Primer*. NSIDC also produces the CD-ROM *Into the Arctic: Information and Educational Activities for Studying Climate*, which includes lessons suitable for high school and college classrooms.

Found at: http://www-nsidc.colorado.edu/NSIDC/EDUCATION/

Further contact info:
User Services
NSIDC/WDC CIRES
Campus Box 449
University of Colorado

Boulder, CO USA 80309-0449 Telephone: (303)492-6199 FAX: (303)492-2468

E-mail: nsidc@kryos.colorado.edu WWW: http://www-nsidc.colorado.edu

NASA's National Space Science Data Center (NSSDC) (rev. 12/02/97)

NASA Planetary data from Galileo, Magellan (Venus), Viking (Mars), and Voyager (outer planets) are available on CD-ROM. Selected images from the popular CD-ROMs and software are accessible via anonymous FTP from nssdc.gsfc.nasa.gov/pub, in the directories /pub/cdrom/image and /pub/cdrom/software, respectively (also /pub/planetary). Also available are videotapes of a computer-animated Venus flight, a SIR-A movie, solar system visualization, and various press release photographs. A CD-ROM catalog listing over 500 CD-ROMs (largely planetary data) can be accessed on the World Wide Web from http://nssdc.gsfc.nasa.gov/cd-rom/cd-rom.html. Their most popular CD amongst educators is Welcome to the Planets. Images from the Mars Pathfinder Project are also accessible thru their web page.

Note: NSSDC is transitioning its Earth Science-related data to other sites. For more information, see http://nssdc.gsfc.nasa.gov/earth/earth home.html.

32 of 49

There is also an NSSDC General Public Page, intended to guide members of the general public to NASA/NSSDC data and services most likely to be of interest to the non-researcher/scientist segment of the internet community, found at http://nssdc.gsfc.nasa.gov/nssdc/gen_public.html.

Coordinated Request User Support Office (CRUSO)

Code 633

National Space Science Data Center NASA Goddard Space Flight Center

Greenbelt, MD 20771 USA Telephone: (301) 286-6695 FAX: (301) 286-1635

E-mail: request@nssdca.gsfc.nasa.gov WWW: http://nssdc.gsfc.nasa.gov FTP: nssdc.gsfc.nasa.gov/pub

NASA SpaceLink (new 11/30/98)

Main page - an aeronautics and space resource for educators; includes Spacelink EXPRESS mailing list for announcements of new NASA educational materials http://spacelink.nasa.gov/

NASA Educational Products -

 $\underline{http://spacelink.nasa.gov/Instructional.Materials/NASA.Educational.Products/.index.html} \\ Curriculum Support -$

http://spacelink.nasa.gov/Instructional.Materials/Curriculum.Support/.index.html

Multimedia - from on-line slide shows to video tapes and software

http://spacelink.nasa.gov/Instructional.Materials/Multimedia/.index.html

National Education Standards -

http://spacelink.nasa.gov/Instructional.Materials/National.Education.Standards/.index.html Educational Services - designed to support students, teachers, and faculty in the areas of science, mathematics, and technology

http://spacelink.nasa.gov/Educational.Services/

National Geographic "Xpeditions" (new 11/30/98)

This huge and growing site for geography educators and students contains more than a hundred original lesson plans and after-school activities for grades K-12, an outline map atlas with more than 1,800 free maps designed for printing or building Web sites, forums where teachers and students can discuss geography, and a 3-D virtual museum of geography built in the spirit of the game Myst.

WWW: http://www.nationalgeographic.com/xpeditions

National Marine Educators Association (rev. 12/02/97)

The National Marine Educators Association brings together those interested in the study and enjoyment of the world of water - both fresh and salt. Affiliated with the national Science Teachers Association and the American Association for the Advancement of Science, NMEA provides a valuable focus for marine and aquatic studies all over the

world.

Members of NMEA receive two publications as part of their benefits. *Current: The Journal of Marine Education*, features in-depth articles about marine physical, earth and life sciences; maritime history; marine education; research in marine education; and marine literature, songs and art. *NMEA News* keeps members up to date with events and activities of regional chapters, developments and news in marine science and education, and opportunities for professional development.

Each summer a regional chapter hosts the national NMEA conference at a local university. At these meetings, marine educators from the United States, Canada and other countries gather to exchange ideas, experiences and teaching techniques, hear the latest research news and renew friendships with colleagues.

Tina Shoemaker National Marine Educators Association P.O. Box 1470 Ocean Springs, MS 39566-1470

Phone: 601-374-7557 Fax: 601-374-5559

E-mail: tshoemak@seahorse.ims.usm.edu

WWW: http://www.marine-ed.org

National Oceanic and Atmospheric Administration(NOAA) (rev. 12/02/97)

Educational Affairs Division (rev. 12/02/97)

NOAA, the National Oceanic and Atmospheric Administration, has an Educational Affairs Division which works with schools. Teachers, librarians, and students at all levels can now receive selected NOAA educational items directly through the Internet. Internet users can reach NOAA's educational inquiries materials by entering "telnet gopher.esdim.noaa.gov" at the Internet prompt, logging in as "gopher," selecting Connection to NOAA's On-Line Data and Information Systems, and then Educational Inquiries. Information categories include global change, weather, satellite information, and marine studies. To obtain information and brochures on their programs and materials, write to:

U.S. Dept. of Commerce/NOAA PA/Correspondence Unit 1305 East-West Highway, #8624 Silver Spring, MD 20910 Gopher: gopher://esdim.noaa.gov

Office of Global Programs (rev 7/24/98)

The Office of Global Programs hosted the Mississippi River Climate Teacher Workshop June 10-12, 1998 in St. Louis. This workshop provided middle and high school teachers with information about climate and environmental issues, particularly as they relate to the Mississippi River Basin.

Adrienne Calhoun

NOAA-Office of Global Programs 1100 Wayne Avenue, Suite 1210 Silver Spring, MD 20910

Phone: 301-427-2089 x511 E-Mail: calhoun@ogp.noaa.gov

Satellite Information (rev. 11/26/97)

For information on how to receive NOAA satellite data in the classroom, contact:

Wayne G. Winston NOAA/NESDIS Direct Services Div. E/SP3 FB 4, Room 3320 Stop 9909 Washington, DC 20233-9909

Telephone: (301) 457-5681 FAX: (301) 457-5620

E-mail: satinfo@nesdis.noaa.gov, or, wayne.winston@noaa.gov

WWW: http://140.90.207.25:8080/noaasis.html

NOAA's National Climatic Data Center (NCDC) (rev. 12/02/97)

Teacher and student packages (limit three per classroom) containing brochures and pamphlets describing weather and climate, and NCDC publications may be obtained from:

National Climatic Data Center Climate Services Branch 151 Patton Avenue - Room 468 Asheville, NC 28801-5001 Telephone: (704) 271-4800 FAX: (704) 271-4876

E-mail: questions@ncdc.noaa.gov, or orders@ncdc.noaa.gov

WWW: http://www.ncdc.noaa.gov

NCDC also offers access to various databases and on-line systems through their web site. One useful item relating to educators is the CLIMVIS system. The CLIMVIS system (http://www.ncdc.noaa.gov/onlineprod/drought/xmgr.html) is an interactive visualization program that permits NCDC users to choose a city from over 10,000 locations worldwide and visually "see" the climate for the time selected. Students can compare the climate at various cities around the globe, or can observe and study how the climate varies at any city for a long period of time or region.

NOAA's National Geophysical Data Center (NGDC) (rev. 12/02/97)

NGDC combines in a single data center activities in the fields of marine geology and geophysics, solid earth geophysics, solar-terrestrial physics, paleoclimatology, ecosystems, and environmental data. In addition, NGDC cooperates with the National Snow and Ice Data Center, which is operated under contract by the University of Colorado. Products include data (much of which is on CD-ROM), slides and posters. Many products can be used for education. There are costs associated with some products.

35 of 49

National Geophysical Data Center (NGDC) NOAA/NESDIS/NGDC, Code E/GC4 325 Broadway

Boulder, CO 80303-3328 Telephone: (303) 497-6826

FAX: (303) 497-6513 E-mail: info@ngdc.noaa.gov

WWW: http://www.ngdc.noaa.gov
Gopher: gopher://gopher.ngdc.noaa.gov

NOAA's National Oceanographic Data Center (NODC) (rev. 12/03/97)

To subscribe to the *Earth System Monitor*, the NOAA National Environmental Satellite, Data, and Information Service's quarterly publication describing NOAA data and information services, or to inquire about educational materials or research data, contact:

National Oceanographic Data Center (NODC)

User Services Group NESDIS/NOAA E/0C1 SSMC3, 4th Floor 1315 East-West Highway

Silver Spring, MD 20910-3282

Telephone: (301) 713-3277 FAX: (301) 713-3302

E-mail: services@nodc.noaa.gov WWW: http://www.nodc.noaa.gov,

http://www.nodc.noaa.gov/NODCpub-periodical.html

Gopher: gopher://gopher.nodc.noaa.gov

NetDav

NetDay is a grass-roots volunteer effort to wire schools so they can network their computers and connect them to the Internet. Labor and materials are provided by volunteers and support from companies, unions, parents, teachers, students and school employees. In addition to information on wiring schools, their web site also has many other helpful resources, such as information on free or discounted hardware and software, a help desk, and links to other education and Internet sites.

E-mail: netday@netday.org WWW: http://www.netday.org

Network Montana - Hydrosphere Activities (rev. 12/08/97)

This is a source of many hands-on activities for understanding the hydrologic cycle, marine life dynamics, and surface ocean conditions.

WWW: http://www.math.montana.edu/~nmp/materials/ess/hydrosphere/index.html

Newton's Apple (rev. 12/02/97)

Lesson plans from the award-winning television series.

Director of Outreach & Promotion NEWTON'S APPLE 172 4th St. E Saint Paul, MN 55101 U.S.A.

Telephone: (800) 588-NEWTON E-mail: newtons.apple@umn.edu

WWW: http://ericir.syr.edu/Projects/Newton/

Now What Software (rev. 12/03/97)

Now What Software specializes in developing geographic multimedia products with the Maps that MoveTM interface and engine. All titles endeavor to make geography, science and history as compelling as video games. The goal is to repackage hard scientific data into engaging and educational programs. CD-ROM titles available under the *Small Blue Planet* series include:

The Real Picture World Atlas, The Cities Below, Earthscapes in Time, 3-D Talking Globe, and TimeCity Flashback Atlas (cost: \$30-\$50 each). A Teacher's Guide with lesson plans is also available. For more information, contact:

Now What Software 500 Sansome St., Suite 501 San Francisco, CA 94111 Telephone: (415) 394-5015 FAX: (415) 394-5035

E-mail: SmallBlue@aol.com
WWW: http://www.nowwhat.com

Ocean World (new 07/29/98)

Ocean World is a collection of short on-line lessons with topics such as: El Nino, Ice Ages, Fisheries, Waves, Iceberg, and Currents. There are links to additional web resources in these areas. This material was produced at Texas A&M University as part of the TOPEX/Poseidon Education Project.

E-mail: srohr@ocean.tamu.edu

WWW: http://www-ocean.tamu.edu/education/oceanworld

One Sky, Many Voices (rev. 08/11/98)

This project engages middle school students in collaborative, real-time study on various topics related to the weather, air quality, and the environment. Students utilize internet communications to exchange ideas and to obtain hands-on learning. Upcoming programs include: Hurricanes '98 (in October 1998), and Kids as Global Scientists (in Feb. - April 1999). New participating classrooms are actively being sought. Also offered are programs for teachers only; in SharedAir '98, teachers take observations of air quality and compare them with other groups upwind and down wind of their location.

One Sky, Many Voices
Department of Atmospheric Science
University of Michigan
Ann Arbor, MI 48109-2143
E-mail: onesky@umich.edu

WWW: http://onesky.engin.umich.edu

Operation Pathfinder (rev. 1/16/98)

Operation Pathfinder provides elementary and middle school teachers with hands-on experience applying marine and aquatic concepts in an intensive two-week summer session at one of six regional sites. Teachers obtain three graduate credit hours for their participation. The topics include Deep Ocean Discoveries and Technologies, Marine and Aquatic Resources, Marine and Aquatic HAbitat, Marine and Estuarine Pollution, Physical Processes, and Plate Tectonics. The program, now in its fifth year, is sponsored by the National Sea Grant Office.

Dale Ingmanson NOAA/OAR 1315 East-West Highway Silver Spring, MD 20910 Phone: (301) 713-2431 ext. 142

E-mail: See the web page below for a contact person in your region

WWW: http://www.mdsg.umd.edu/NSGO/pathfinder.html

Planet Earth Science, Inc. (rev. 12/04/97)

Planet Earth Science, Inc. provides students with virtual expeditions on a ship to study El Niño and monsoons with the CD-ROM, *Ocean Expeditions*. The students collect and analyze real data and investigate the interaction of the atmosphere and ocean. The product is available on a 45-day trial basis (call Tom Snyder Productions). The company also provides summer teacher training workshops on various subjects in earth system science, including El Niño.

Planet Earth Science, Inc. 1203 De La Vina Street Santa Barbara, CA 93101

Phone: (805) 730-1622, and (800) 342-0236 (Tom Snyder Productions)

FAX: (805) 730-1625

WWW: http://www.planearthsci.com/home.htm, and http://www.TeachTSP.com (Tom

Snyder Productions)

Practical Uses of Math and Science (PUMAS) (rev. 12/08/97)

PUMAS provides short lessons demonstrating how science can be taught using interesting examples from everyday life.

WWW: http://pumas.jpl.nasa.gov/examples/ex7_1.html

Project EarthSense (new 2/27/98)

Project EarthSense is a hands-on environmental education program for K-12 teachers. The focus is upon global environmental change, remote sensing and hydrology.

WWW: http://www.earthsense.uah.edu

Project Oceanography (rev. 08/26/98)

Project Oceanography is weekly television broadcast that provides marine science education to middle school students. Topics over the past season have included: Satellite Oceanography, Deep Sea Biology, Oceans in Motion, Natural Disasters, Aquaculture, and Careers in Marine Science and Technology. Over 100 middle schools currently participate.

Dr. Paula Coble or Juli Rasure Department of Marine Science 140 Seventh Avenue South University of South Florida St. Petersburg, FL 33701

Phone: (727) 553-1631 (Coble), (727) 553-3939 (Rasure)

Fax: (727) 553-1189

WWW: http://www.marine.usf.edu/pjocean

E-mail: pcoble@marine.usf.edu, jrasure@seas.marine.usf.edu

Reef Ball Development Group (rev. 12/12/97)

Learn how to "plant" your own artificial reef.

Reef Ball Development Group, Ltd. P.O. Box 3349

Sarasota, FL 34230

Telephone: (941) 752-0169

Fax: (941) 752-1033

E-mail: reefball@america.net WWW: http://www.reefball.org

Remote Sensing Core Curriculum (rev. 12/12/97)

The Remote Sensing Core Curriculum is a NASA sponsored program to provide educators with a basic set of material for an introductory course. There are four volumes in the set: i) Introduction to Photo Interpretation and Photogrammetry, ii) Overview of Remote Sensing of the Environment, iii) Introductory Digital Image Processing, and iv) Applications in Remote Sensing.

Tracey Benjamin

E-mail: tbenja1@strabo.umbc.edu WWW: http://www.umbc.edu/rscc

The Remote Sensing Tutorial (rev. 08/07/98)

A 20-section, on-line tutorial approach to learning about the role of space science and

technology in monitoring the Earth's oceans, land surface and atmosphere. The tutorial was developed at NASA's Goddard Space Flight Center and is also available on a CD for \$10 (check or money order, made out to GST, to cover production and shipping; Mac and PC only).

To obtain individual copies or to inquire about multiple copies for class use, write to:

Bill Dickinson, Jr. (RS Tutorial) Global Science and Technology, Inc., 6411 Ivy Lane, Suite 300, Greenbelt, MD 20770

E-mail: rstwebmaster@gst.com

WWW: http://code935.gsfc.nasa.gov/Tutorial/TofC/Coverpage.html

Schools of the Pacific Rainfall Climate Experiment (SPaRCE) (rev. 12/03/97)

A program to increase the number of rain gauges across the Pacific by involving students in various islands of the Pacific. For more information about the SPaRCE program, please contact:

SPaRCE Headquarters Oklahoma Climate Survey University of Oklahoma 100 East Boyd, Suite 1210 Norman, OK 73019 USA Telephone: (405) 325-3207 FAX: (405) 325-2550

E-mail: sparce@hoth.gcn.ou.edu

WWW: http://radar.ou.edu/sparce/sparce.htm

Science Lesson Plans over the Internet (UCI) (rev. 12/03/97)

Science lesson plans that can be downloaded over the internet. Contains material for K-6, 6-9, and 9-12. Includes material on El Niño for elementary students.

Frank Potter UC Irvine Irvine, CA 92697-4680

E-mail: fpotter@vmsa.oac.uci.edu

WWW: http://www-sci.lib.uci.edu/SEP/CTS

S'COOL (rev. 12/03/97)

The Students' Cloud Observations On-Line (S'COOL) is an opportunity for elementary and secondary students to gather observations about clouds. The data will be used in the Clouds and the Earth's Radiant Energy System (CERES) project in NASA's Mission to Planet Earth program.

Langley DAAC User and Data Services, Attn: S'COOL Mail Stop 157D

NASA Langley Research Center Hampton, VA 23681-0001 USA Telephone: (757) 864-5682

FAX: (757) 864-9882 E-mail: scool@larc.nasa.gov

WWW: http://asd-www.larc.nasa.gov/SCOOL

Seastar! (rev. 1/19/98)

Seastar! provides access to beach profile data from several sites in the U.S. and Australia. They also provide instructions for field trips that enable middle school students to make their own measurements.

Phyllis Rumpp Bala Cynwyd Middle School 510 Bryn Mawr Avenue Bala Cynwyd, PA 19004 Telephone: (610) 664-4500

FAX: (610) 278-2447

E-Mail: seastar@mciunix.mciu.k12.pa.us, per2061@aol.com

WWW: http://mciunix.mciu.k12.pa.us/~seastar, OR:

George Rumpp Colonial Middle School 716 Belvoir Road Norristown, PA 19401 Telephone: (610) 275-5100 FAX: (610) 278-2447

E-Mail: seastar@mciunix.mciu.k12.pa.us, george3268@aol.com

Sea World/ Busch Gardens (rev. 01/21/98)

Sea World and Busch Gardens have prepared a series of Teacher's Guides about marine life for all grade levels. They also have more than 75 educational resources, including posters and information booklets.

WWW: http://www.seaworld.org/teacherguides/teacherguides.html

Smithsonian Institution (rev. 12/01/97)

The Smithsonian Institution produces an on-line booklet, *Ocean Planet*, based on their traveling exhibit of the same name. The booklet contains lessons and activities for use in middle and high school classrooms.

WWW: http://educate.si.edu/lessons/currkits/ocean/main.html

Space Technology Education Program (rev. 12/31/97)

The Space Technology Education Program (STEP) was originally a NASA-sponsored program to enhance K-12 education with classroom applications of satellite Direct Readout technology. ERIM International now continues to support the development of

satellite direct readout as a means to promote math and science learning in K-12 schools. They are pleased to share their experence with teachers and have set up a "Technology Learning Center" for educators at ERIM.

Thomas Wagner
Space Technology Education Program
ERIM International Inc.
P.O. Box 134008
Ann Arbor, MI 48113-4008 USA

Telephone: (313) 994-1200, ext. 3307

FAX: (313) 665-6559

E-mail: twagner@erim-int.com

Starfish: Educational Resources for Sustainability (new 01/22/98)

"Starfish: Educational Resources for Sustainability" is Second Nature's collection of free databases designed to help faculty from all disciplines integrate environmental and sustainability issues into their teaching.

WWW: http://www.starfish.org/

Teaching the Physics and Math of Oceanography with Scientific Data (TOPEX) (new 11/25/98)

The University of Washington and The Northwest School in Seattle are collaborating to enhance the links between the teaching of physics, math, and physical and geological oceanography. Physical Oceanography Curriculum is aligned between these three levels, in order to provide a coherent framework that spans a range of students and levels. TOPEX satellite altimeter data provides a rich framework to explore many aspects of data collection, oceanography concepts and climate across these levels. For high school, undergraduate and graduate students.

WWW: http://www.ocean.washington.edu/people/staff/prs/edu.html

Tech Corps

The mission of the Tech Corps is to recruit, place, and support volunteers from the technology community who advise and assist schools in the introduction and integration of new technologies into the educational system. Volunteers provide assistance with local planning, technical support and advice, staff training, mentoring, and classroom interactions. The organization utilizes the abilities of skilled individuals and groups across the country in an effort to prepare students, teachers, and schools for the 21st century.

E-mail: info@ustc.org

WWW: http://www.ustc.org

The Earth System (TESY) (rev. 12/03/97)

The Earth System (TESY) is a series of web-based, college-level modules that explain the components of the earth system through the use of large data sets. The modules were developed by the Department of Earth and Environmental Sciences at Columbia

University. Included are lessons on climate and the solid earth.

Jim Hays, Project Coordinator
The Earth System (TESY)
Department of Earth and Environmental Sciences
Columbia University
New York, NY 10027 USA
E-mail: jimhays@ldeo.columbia.edu

WWW: http://rainbow.ldeo.columbia.edu/ees

TOPEX/Poseidon Educational Outreach

This is a source of exercises for understanding measurements of sea surface heights and ocean currents for K-12 students. A movie can be viewed showing the eddies within the Gulf of Mexico.

E-mail: badler@shaman.colorado.edu

WWW: http://shaman.colorado.edu/~badler/outreach2.html

UCSB - Our Dynamic Planet CD-ROM (rev. 12/31/97)

Bill Prothero of the Dept. of Geological Sciences, University of California, Santa Barbara, has produced a CD-ROM, supporting lab manual, and an instructors manual for a lower division Oceanography course with a quantitative science component called *Our Dynamic Planet* (formerly *Exploring the Deep*). A copy of the CD-ROM and lab book can be ordered (cost about \$25) from:

UCSB Bookstore Attn: Susan Carthy P.O. Box 13400

Santa Barbara, CA 93107 Telephone: (805) 893-2367

E-mail: prothero@magic.ucsb.edu

WWW: http://oceanography.geol.ucsb.edu

UNESCO's BILKO Project (rev. 12/03/97)

The United Nations Educational, Scientific and Cultural Organization (UNESCO) produces a tutorial package of software and lessons to enhance the teaching and study of remotely-sensed coastal and marine data (satellite images). Five DOS-based tutorial packages exist and a Windows version is available on the Internet. A further series of Windows-based lessons derived from a project to investigate the cost effectiveness of using remote sensing in coastal management is being developed as well.

The material is distributed free of charge. UNESCO asks that all users complete an evaluation sheet and appreciates additional comments, enhancements to existing lessons and new lesson material.

UNESCO

Coastal Regions and Small Islands (CSI)

Dr. Dirk G. Troost 1, rue Miollis 75732 Paris Cedex 15 FRANCE

FAX: (33) 0 1 45 68 58 08 E-mail: d.troost@unesco.org

WWW: http://www.ncl.ac.uk/~ntcmweb/bilko/bilko.htm

University Corporation for Atmospheric Research (UCAR) and National Center for Atmospheric Research (NCAR) (rev. 12/19/97)

UCAR provides numerous resources for educators. General information can be obtained from the contact below. Descriptions of several programs follow.

Milli Butterworth UCAR Communications P.O. Box 3000 Boulder CO 80307-3000 Telephone: (303) 497-8601 FAX: (303) 497-8610

E-mail: butterwo@ncar.ucar.edu WWW: http://www.ucar.edu/edu

Global Change Instruction Program (rev. 12/19/97)

The Global Change Instruction Program has produced eight modules for use in undergraduate nonscience courses. Current titles include: Biological Consequences of Global climate Change, Climatic Variation in Earth History, Clouds and Climate Change, El Nino and the Peruvian Anchovy Fishery, Population Growth, The Sun-Earth System, System Behavior and System Modeling, and Instructor's Manual for System Behavior and System Modeling. Several additional modules are under development. GCIP is looking for teachers willing to test these materials in their classrooms.

Lucy Warner, Program Manager Global Change Instruction Program P.O. Box 3000 Boulder, CO 80307-3000

E-mail: lwarner@ucar.edu

WWW: http://www.ucar.edu/edu/ucargen/education/gcmod/contents.html

An Introduction to Atmospheric and Oceanographic Data (rev. 12/02/97)

The following document is a good resource about atmospheric and oceanographic data sets for educators, new researchers and/or graduate students:

Shea, D. J., et al., 1994: *An Introduction to Atmospheric and Oceanographic Data*, NCAR Technical Note TN-404. For a hard copy, contact:

Dennis Shea

National Center for Atmospheric Research

P.O. BOX 3000

Boulder, CO 80307-3000 Telephone: (303) 497-1361 E-mail: shea@ncar.ucar.edu

WWW: http://www.cgd.ucar.edu:80/cas/tn404/ (web version)

LEARN (rev. 12/19/97)

LEARN (Laboratory Experience in Atmospheric Research at NCAR) is a program for middle-level and junior-high teachers in Atmospheric Research. The goal of LEARN is to improve understanding of the atmospheric sciences and related mathematics, and to improve science teaching methodology through experiential training (involvingin-service and summer workshops). Three Curriculum Modules, developed by teams of teachers and scientists at NCAR during the previous phase of this project, are available for purchase. They are: Atmospheric Dynamics, Ozone in Our Atmosphere, and Cycles of the Earth and Atmosphere: Impact on the Earth's Climate. For more information, please contact:

LEARN also sponsors "Science Saturdays", a series of day-long workshops intended for Colorado teachers. The workshops provide ideas for hands-on activities in the atmospheric and global environmental sciences.

Carol F. McLaren LEARN Director P.O. Box 3000

Boulder, CO 80307-3000 Telephone: (303) 497-8107 FAX: (303) 497-8610 E-mail: cmclaren@ucar.edu

WWW: http://www.dir.ucar.edu/iss/learn

Reports to the Nation (rev. 12/02/97)

The UCAR Joint Office for Science Support (JOSS) and the NOAA Office of Global Programs publishes *Reports to the Nation on Our Changing Planet*, a series of general interest monographs that are aimed at providing science-based information on issues regarding climate and global change for the general public. *Our Ozone Shield* and *El Niño and Climate Prediction* are currently available. A new issue, tentatively titled *Our Changing Climate*, is soon to be published.

Reports to the Nation
Paula M. Robinson
UCAR Joint Office for Science Support (JOSS)
P.O. BOX 3000

Boulder, CO 80307-3000 Telephone: (303) 497-8665 FAX: (303)497-8633 E-mail probinso@ucar.edu

WWW: http://www.joss.ucar.edu/joss_psg/publications/

Science Now (magazine) (rev. 12/19/97)

Science Now focuses on making current topics in the atmospheric and global sciences accessible to middle school students. All issues of this magazine are available on-line.

Caroline Hanson

UCAR

P.O. Box 3000

Boulder, CO 80307

E-mail: chanson@ncar.ucar.edu

WWW: http://www.sirs.com/corporate/newsletters/snow/snowtoc.htm

SkyMath (rev. 12/19/97)

SkyMath: "Making Mathematical Connections, Using the Science and Language of Patterns to Explore Temperature," is a comprehensive six-week module for the middle school mathematics classroom. It uses current environmental and real-time weather data to promote the learning of mathematics.

Beverly Lynds SkyMath P.O. Box 3000

Boulder, CO 80307-3000

E-mail: blynds@unidata.ucar.edu

WWW: http://www.unidata.ucar.edu/staff/blynds/Skymath.html

Unidata (rev. 12/19/97)

Unidata sponsors the Internet Data Distribuiton (IDD) system for bringing near real-time earth observation data into the college classroom. Data availableinclude: Conventional Weather Reports, Output from Supercomputer Forecast Models, Satellite Imagery, Radar Data, and Lightning Strike Data. Data also may be contributed from any of the IDD receiving sites. Over 130 universities participate in this project.

UCAR Unidata Program Center

P.O. BOX 3000

Boulder, CO 80307-3000 Telephone: (303) 497-8644

E-mail: support@unidata.ucar.edu WWW: http://www.unidata.ucar.edu

U.S. Coast Guard Academy, Remote Sensing Curriculum (rev. 12/03/97)

For suggestions on using oceanographic data in the classroom, such as the MCSST-CZCS CD-ROMs (available from the JPL PO.DAAC*) and SSM/I sea ice data (available from the NSIDC DAAC*), contact Michael Alfultis at the U.S. Coast Guard Academy. Studying the Environment from Space Lab Manual, Satellite Data, and Display Programs for Apple Macintosh Computers are available from him for cost of duplication. Portions of the curriculum are also accessible on a web page. Lab exercises include:

1. Introduction to Remote Sensing Principles

- 2. CZCS Phytoplankton Concentration Observations
- 3. AVHRR Observations
- 4. SSM/I Sea Ice Concentration Observations
- 5. TOMS Ozone Concentration Observation

Note: the curriculum will be revised in 1997; a revised Lab Manual and a Windows 95/NT version of the Display Programs should be available by Jan. '98.

LCDR Michael Alfultis
U.S. Coast Guard Academy
Dept. of Science
15 Mohegan Avenue
New London, CT 06320
Telephone: (860) 444-8633
E-mail: alfultis@dcseq.uscga.edu

WWW: http://satori.gso.uri.edu/satlab/ (lesson plans and some exercises)

*See NASA's EOSDIS Distributed Active Archive Centers

U.S. Geological Survey (rev. 12/30/97)

There are a number of free educational resources available from the U.S. Geological Survey. These resources, which include posters, lesson plans, brochures, activity books and audiovisual aids, are listed in *Educational Materials from the U.S. Geological Survey*. Contact the address below to request a copy.

An on-line USGS Educational Materials List can be found at: http://www.usgs.gov/education/edulist.html

Information concerning topographic maps and aerial photography covering the United States, as well as world-wide satellite imagery, may be obtained from the USGS Earth Science Information Centers. An address list (and other helpful information) can be viewed at http://mapping.usgs.gov/esic/.

U.S.G.S. Information Services

Box 25286

Denver, CO 80225

Telephone: (800) HELP-MAP

FAX: (303) 202-4693

E-mail: infoservices@usgs.gov

WWW: http://www.usgs.gov/ (see their Education link)

Universities Space Research Association (USRA)

USRA's Earth System Science Education Program is an excellent resource for earth system science education.

Discover Earth Teacher Training Workshops (rev. 11/26/97)

NASA sponsors several teacher workshops and conferences. A recent example was

Discover Earth, a workshop on Earth system science education for educators in grades 5-12, held July 14-25, 1997 at Univ. of MD, College Park. Future workshops of this type will be listed at: http://www.usra.edu:80/esse (Earth System Science Education Program)

Colleen Steele, Discover Earth Project Manager

1745 Jefferson Davis Highway, Suite 306

Arlington, VA 22202 Telephone: (703) 415-8673 FAX: (703) 415-8690

E-mail: colleen_steele@strategies.org

WWW: http://www.usra.edu/esse/discover.html

Curricula developed by these workshops are available from: http://www.strategies.org

Earth System Science Education Server (rev. 12/12/97)

The Earth System Science Education web site is an extensive resource for those teaching an undergraduate course in earth system science. The site provides learning modules, reviews of textbooks, and lists of courses taught at other departments. Currently, 22 schools are receiving funding for development of curricular material as part of this NASA-sponsored effort.

WWW: http://www.usra.edu/esse/ESSE.html

Earth System Science and Global Change Learning Modules(new 08/07/98)

This series of modules for college classes includes: Sea Ice in the Polar Regions, Arctic Observatory, and Carbon Cycle Modeling using STELLA Software.

WWW: http://www.usra.edu/esse/learnmod.html

Weather Channel (rev. 12/04/97)

The Weather Channel has a "Cable in the Classroom" program called The Weather Classroom. It is a series of commercial-free educational TV programs with 39 episodes including topics on clouds, the water cycle, tornadoes, and forecasting. Each episode has an accompanying on-line teacher's guide and suggestions for related classroom experiments. See their web site for a program schedule. Look Up! Setting a Course for Sky Awareness is another program that they sponsor with related materials available for purchase. They have a number of other resources available for teachers, including the *Everything Weather* CD-ROM and Teacher's Guide (for grades 5 and up).

Weather Channel Education Department 300 Interstate North Parkway Atlanta, GA 30339

E-mail: lbuss@weather.com

WWW: http://www.weather.com/education

Whales: A Thematic Unit (rev. 12/08/97)

This is a comprehensive resource for whale education. It includes lessons plans, student activities, project ideas, and listings of other resources.

WWW: http://curry.edschool.virginia.edu/go/Whales

WXP Weather Processor (Purdue University) (rev. 12/12/97)

WXP provides on-line weather maps for the continental U.S., including forecasts, current conditions, and archived data.

Dan Vietor

E-mail: devo@eas.purdue.edu WWW: http://wxp.atms.purdue.edu

Disclaimer: The above listings should not be considered endorsements by PO.DAAC, the Jet Propulsion Laboratory, the California Institute of Technology, or NASA.

Education Resources for Oceanography and Earth Sciences / http://podaac.jpl.nasa.gov/edudoc.html
Produced by the JPL Physical Oceanography DAAC / Contact <u>podaac@podaac.jpl.nasa.gov</u> with comments, updates or additions.